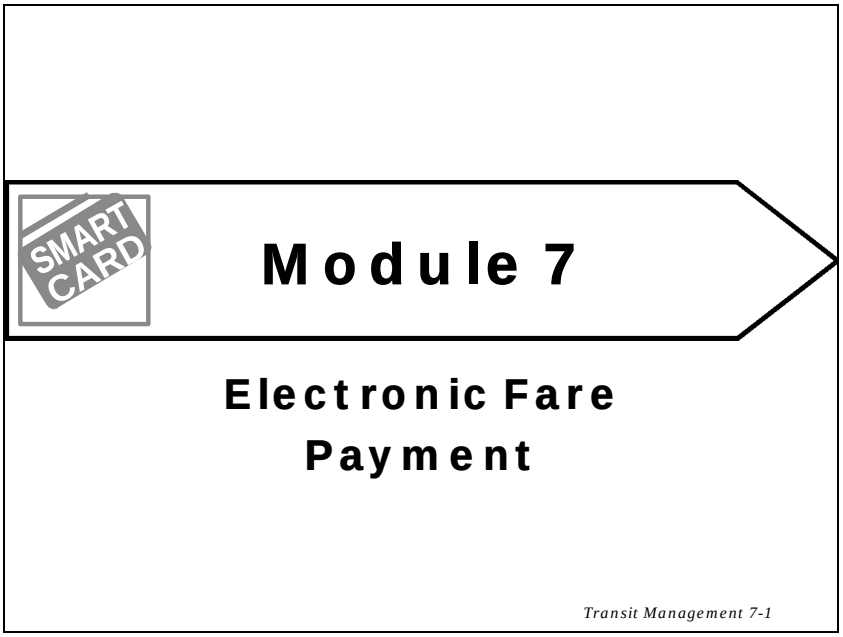
Module 7: Electronic Fare Payment



TRANSIT MANAGEMENT TRAINING ROADMAP	
	Module 1: Introduction to ITS and APTS
	Module 2: Automatic Vehicle Location Systems
	Module 3: Automated Transit Information
	Module 4: Transit Telecommunications
	Module 5: Transit Operations Software
	Module 6: Paratransit Computer-Aided Dispatch
Module 7: Electronic Fare Payment	
	Module 8: Technologies for Small Urban and Rural Transit Systems
	Module 9: Stages of ITS Project Deployment
	Module 10: What Can ITS Do for Me?

Automated Fare Payment Media:
- Magnetic Stripe Card
- Contact Chip Card
- Other "Smart" Cards

Integrated Payment Systems:
- Multimodal System
- Multicarrier System
- Financial Systems

Module 7: Electronic Fare Payment
1.5 Hours

Introduction

Schedule The following table shows the times and activities for this module.

Time	Activity/Topic
5 min.	*Lecture/Discussion:* Introduction
10 min.	*Lecture/Discussion:* Electronic Fare Payment
15 min.	*Lecture/Discussion:* Automated Fare Payment Media
30 min.	*Lecture/Discussion:* Integrated Payment Systems
30 min.	Exercise 7-1: Custom Course Map
90 min.	Total Time

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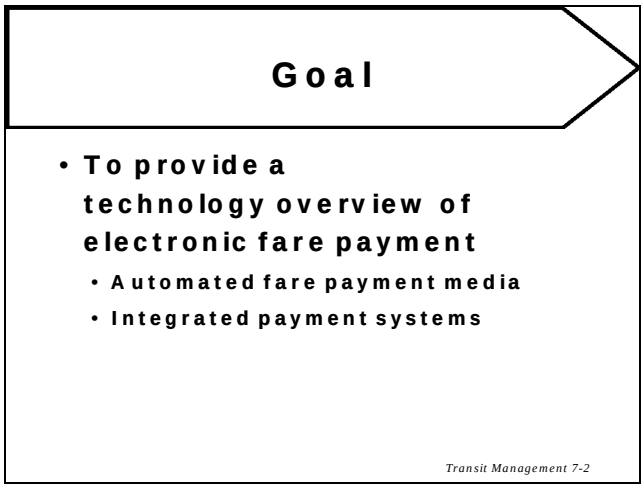
Introduction, Continued

Slide: Goal



Goal

READ the goal of this module.

Say: We'll be spending most of the module talking about Integrated Fare Payment systems.

Objective

Read the module objective:

- Given an APTS Technology Reference table, students will list three benefits of using automated fare payment systems in their agency.

Orient with the roadmap

Show the class where they are with the roadmap on page 1 of their SG.

Explain that we've seen two parts of the ITS Infrastructure which we discussed in Module 1:

- traveler information
- transit fleet management
- This module is the third one we said we'd cover:
  - ◊ electronic fare payment

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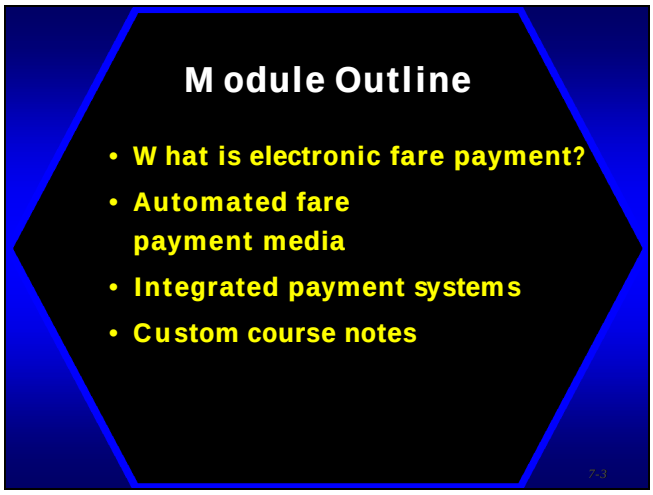
Introduction, Continued

Slide: Module Outline



Module outline

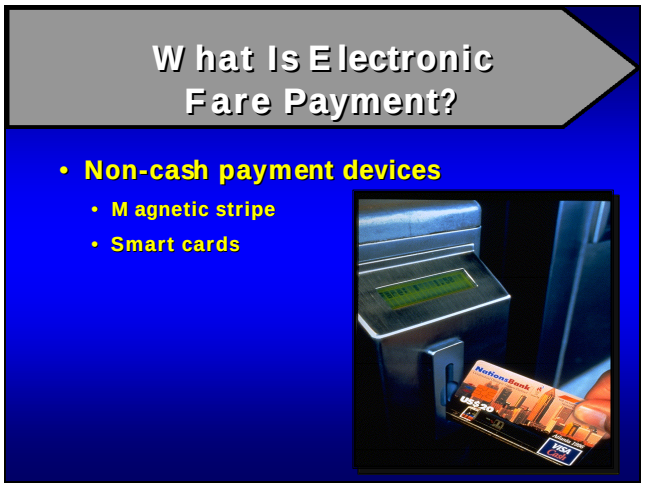
Say: We will begin with a brief overview of electronic fare payment and lead into a quick review of automated fare payment media, and finally, we'll learn how the media is used to develop integrated payment systems.

Electronic Fare Payment

Length

10 minutes lecture/discussion

Slide: What Is Electronic Fare Payment?



What is electronic fare payment?

Explain that electronic fare payment involves the use of non-cash payment devices (media), such as magnetic stripe and smart cards.

The card (media) enables the system and the system takes advantage of the media. Both are needed; they are separate, and yet must work together for an electronic fare payment system.

Electronic fare systems can also include automated clearinghouse technology and other tools to process fares and distribute them among regional transit providers.

- These systems integrate card technology, communications, information systems, and electronic funds transfer systems to improve fare payment convenience and reduce fare system costs.

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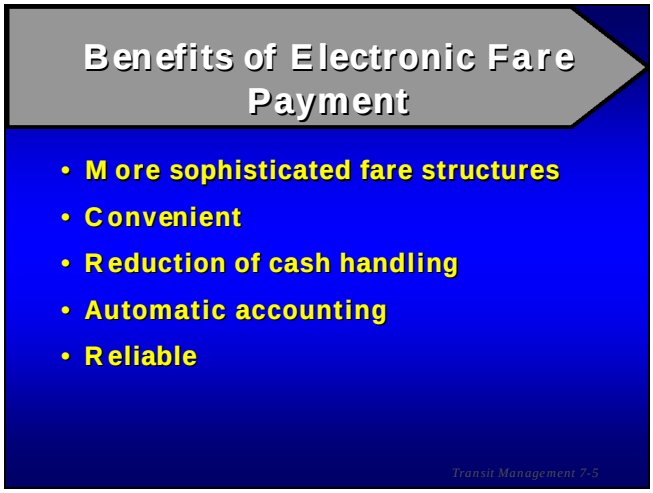
Electronic Fare Payment, Continued

Class question

Ask:

- Does anyone have experience working with electronic fare payment systems?
- Why should fare payment for transit use be automated?

Slide: Benefits of Electronic Fare Payment



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Electronic Fare Payment, Continued

Benefits of electronic fare payment

Say: We will discuss the benefits of electronic fare payment:

- More sophisticated fare structures:
  - ◊ fares based on distance traveled
  - ◊ fares based on time of day traveled; e.g., lower fares during the day or off peak hours
  - ◊ enhanced intermodal transfers which increase ridership; e.g., free transfers from rail to bus
- Improve convenience to users and providers
  - ◊ one payment medium for all transit travel
  - ◊ exact change not required
- Reduces labor-intensive cash handling costs
  - ◊ increase security by reducing theft and fare evasion
  - ◊ greater security in collection process
- Automation of accounting process
  - ◊ allows for creation of networks between different modes and providers
- Improve reliability and maintainability of fare boxes
- Integration of modes & systems
- Economies of scale
- More reliable data on ridership which can aid route planning
- "ADA friendly"

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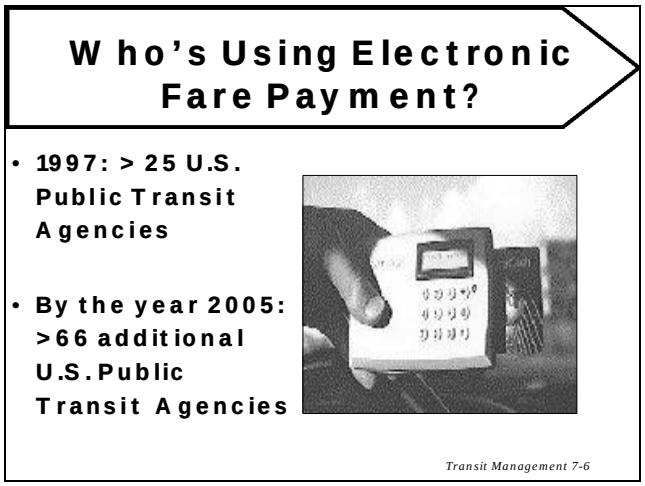
Electronic Fare Payment, Continued

Slide: Who's Using Electronic Fare Payment?



Who's using it?

Say: In 1997:

- 25 U.S. Public Transit agencies use automated fare payment systems
- 19 agencies are implementing automated fare payment
- 28 are in the planning/testing phase

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Electronic Fare Payment, Continued

Class question

Ask: What is the distinction between automated fare payment media and integrated payment systems?

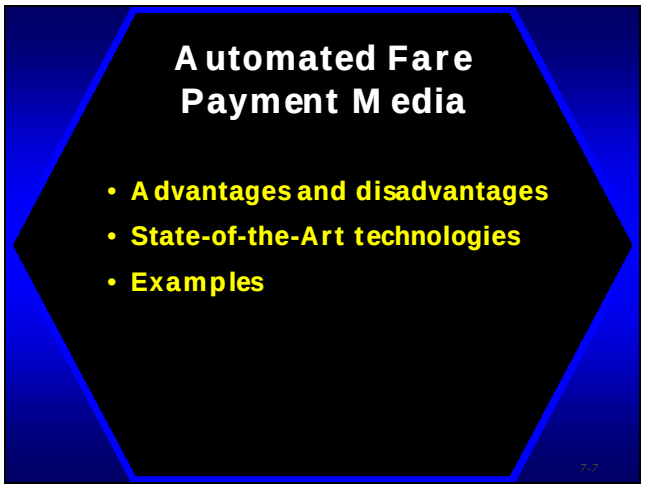
Answer:

- Automated fare payment media:
  - ◊ are various media purchased by transit riders and used for fare payment
  - ◊ is just the card itself
- Integrated payment systems:
  - ◊ are all the institutional arrangements behind the scenes that allow an exchange of information to take place
  - ◊ This is the real challenge.
  - ◊ The media has enabled this to happen.

Automated Fare Payment Media

Length 15 minutes lecture/discussion

Slide: Automated Fare Payment Media



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Automated Fare Payment Media, Continued

Automated fare payment media

Automated fare payment media are capable of storing information in electronically readable form with read/write capability.

Common media include:

- magnetic stripe card
- contact chip card
- contactless card
  - ◊ A proximity card is a type of contactless card – this term is used a lot in the industry.

Show examples of each type of smart card.

Say: In general, these cards are called "smart cards."

Note to instructor: In some circles, the magnetic stripe card is not considered a smart card.

Ask: How many of you have heard the term "smart card" before? Please raise your hands.

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Automated Fare Payment Media, Continued

Three types of cards

Explain the three types of automated fare payment cards:

- contact type
- contactless
- combi-card (hybrid)

Ask: Which type would magnetic stripe card fall under?

- **Answer**: Magnetic stripe is technically a contact type card since it operates with a physical mechanism, but typical industry usage of the term "contact" implies a type of computer chip card.

Ask: Which type would a proximity card fall under?

- **Answer**: contactless type

Ask: Which type would an IC (integrated circuit) chip card fall under?

- **Answer**: contact type

Class question

Ask questions to see how familiar the class is with the fare payment cards listed on the slide, e.g.:

- Are you aware of agencies that use one of these types of cards?
  - ◊ When was the system implemented?
- How many are familiar with read-only fare payment cards?
- How many are familiar with read-write fare payment cards?
  - ◊ What's the difference?
- Are any of these types of cards totally unfamiliar to anyone?

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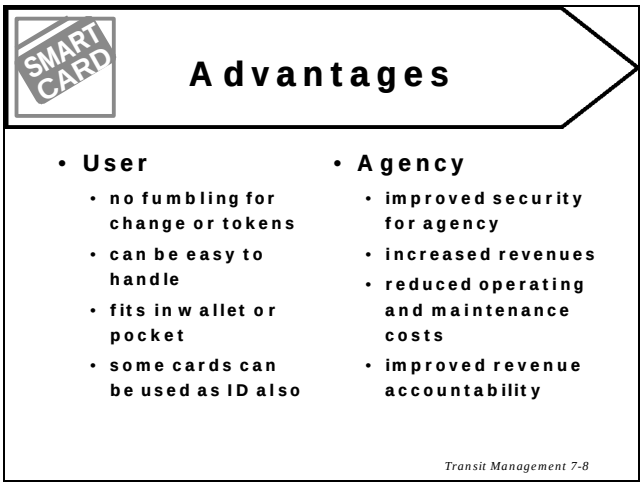
Automated Fare Payment Media, Continued

Slide: Advantages



Note to instructor

***Note to instructor**: if you have two easels, write the general advantages and disadvantages of advanced fare payment media on one of them. Leave this easel visible throughout the discussion of each type of media.*

- *This will help to emphasize general advantages and disadvantages of ALL media as opposed to specific advantages or disadvantages for each particular type of card.*
- *Alternatively, you can take notes on each topic and tape that page to the wall before going on to the next page.*

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Automated Fare Payment Media, Continued

Advantages for the user

Say: In general, smart cards (magnetic stripe, contact chip, and proximity) have several advantages in common.

For the user, a smart card:

- eliminates the need to fumble for change or tokens
- can be easy to handle
- fits conveniently in a wallet or pocket
- can be used as identification, depending on the integrated payment system it's used in
  - ◊ used for ID
  - ◊ storing identification data in ROM

Advantages for the agency

For the agency, a smart card:

- improves security
  - ◊ reduced fare evasion, short changing, and counterfeiting
- increases revenues
- reduces operating and maintenance costs
  - ◊ lower cash handling costs
  - ◊ lower maintenance of turnstile and fareboxes
  - ◊ driver concentrates on driving rather than ticket and coin handling
  - ◊ shortens stop times in urban areas / smoother traffic flow
- improves revenue accountability

Say: These advantages are general for all of the advanced payment media and are dependent on the integrated payment system with which they work. We'll look at general disadvantages next.

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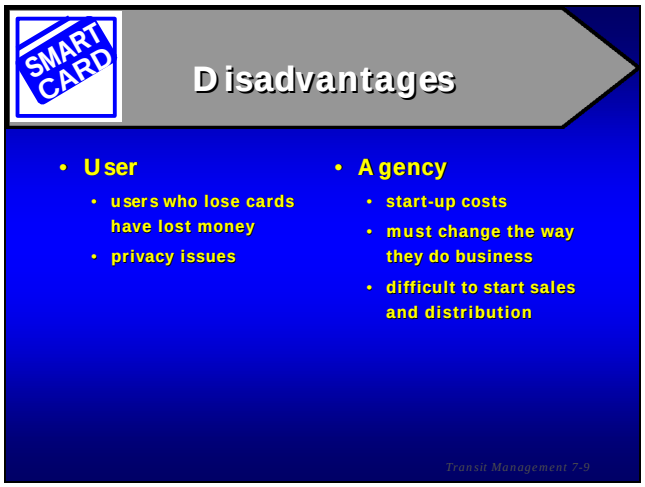
Automated Fare Payment Media, Continued

Slide: Dis-advantages



Dis-advantages for the user

Say: In general, smart cards also have several disadvantages in common.

For the user, a smart card:

- can be like money, in that if you lose it – it's gone
  - ◊ Some systems are now able to identify the amount of money you have left on your card if you lose it, but the tradeoff is that the system has to keep track of when and where you use the card – some people don't like this feature.
- can cause privacy issues
  - ◊ If the card is used for ID, some people believe that decreases their privacy.
- In addition, cards can fail to work if they become torn, folded, or mutilated.

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Automated Fare Payment Media, Continued

Dis-advantages for the agency

For the agency:

- Start-up costs can include the cards, the readers, the maintenance agreements, the software systems to make it all work, the machines that sell or revalue the card, etc.

- A smart card changes the way it does business:
  - ◊ An electronic fare system means an agency has the challenge of rethinking many of its systems, including billing, accounting, etc.
  - ◊ The media by itself is nothing – a new fare system must be developed. We'll be looking at that in the second half of this module.
  - ◊ Difficult to initiate sales and distribution

These disadvantages are general for all of the advanced payment media and are dependent on the integrated payment system with which they work.

- For buses, setting up locations for sales, distribution, and re-charging of cards can be difficult and expensive. *(Note: Rail is easy)*

We'll look at specific advantages and disadvantages of each type of media next. Later, we'll look at the specific features of the payment systems.

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Automated Fare Payment Media, Continued

Slide: State-of-the-Art Magnetic Stripe

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Automated Fare Payment Media, Continued

Magnetic stripe card

Explain: Many transit authorities have selected magnetic stripe cards as the fare payment media for their fare collection systems.

Say: We will discuss the features and operational capabilities of magnetic stripe cards:

- They record data in tracks
  - ◊ similar to recording sound on audio cassettes
  - ◊ multiple tracks available on each stripe
  - ◊ multiple stripes may be used on a card or ticket to increase data capacity
- They are usually made of heavy paper or plastic
- The magnetic force required to overwrite the card is called "coercivity." It can be high or low:
  - ◊ high coercivity makes it extremely difficult to tamper with or rewrite the card, but costs more
  - ◊ high coercivity protects the cards from counterfeiting
  - ◊ low coercivity means the card can be more easily damaged
- They store value
  - ◊ usually rechargeable
  - ◊ usually issued in fixed denominations

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Automated Fare Payment Media, Continued

Estimated capital costs

A DOT nationwide APTS inventory conducted by the Volpe National Transportation Systems Center estimates the capital cost of magnetic stripe-swipe electronic fare payment systems for a range of $1100 to $4000 per vehicle. However, this was only based on 5 responding agencies.

The estimate of the capital cost of magnetic stripe-insertion electronic fare payment systems was $9500 per vehicle based on 1 responding agency.

For more information, see the report *Operation Timesaver – ITI Transit Components* on the Internet page: *http://www.fta.dot.gov/library/technology/APTS/iti/iti.htm*

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Automated Fare Payment Media, Continued

Slide: State-of-the-Art Contact Chip Card

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State-of-the-art contact chip card

Say: The contact chip card is a portable database capable of processing, storing, and safeguarding thousands of bytes of data. The card is passed through a fare reader.

Stored value bank card

The stored value bank card is a specific application of the contact chip card. In general, it is a commercial product under development by bank card companies and member banks. The cash value is stored on the card itself.

Show sample.

- Citibank Visa Cash card being used in the Upper West Side of Manhattan.
- **Show** how the value can be read by pressing the button.

Pass sample and brochure around the room. Make sure they are returned to you at the end of the lesson.

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Automated Fare Payment Media, Continued

Note to instructor

Note to Instructor: Integrated circuit cards contain a microcomputer, electronically erasable programmable memory (EEPROM), and read-only memory (ROM).

- *The microcomputer verifies user identification data, guards against tampering, provides for data encryption, and allows the cash content of the card to be increased.*
- *EEPROM is used for storing data subject to change such as cash content of the card and use history. EEPROM "flash memory" demonstrates increased performance and lowered costs.*
- *ROM stores the operation program and the card identification data.*

Class question

Ask students if anyone has experience using or working with contact chip cards.

- **Allow** one or two students to explain their experience.

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Automated Fare Payment Media, Continued

Slide: State-of-the-Art Contactless Card

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Contactless cards: State-of-the-art

Say: The contactless card uses:

- radio frequency inductive coupling
- an induction coil in the read-write unit to generate a radio frequency magnetic field that couples to another induction coil in the card
  - ◊ physical contact between card and reader not required
  - ◊ card can be read from a range of 1-12 inches and often through a wallet

Note to Instructor: Sometimes this is called a "prox card."

Estimated capital costs

A DOT nationwide APTS inventory conducted by the Volpe National Transportation Systems Center estimates the capital cost of a contactless electronic fare payment systems at $5500 per vehicle based on 1 responding agency.

For more information, see the report *Operation Timesaver – ITI Transit Components* on the Internet page: *http://www.fta.dot.gov/library/technology/APTS/iti/iti.htm*

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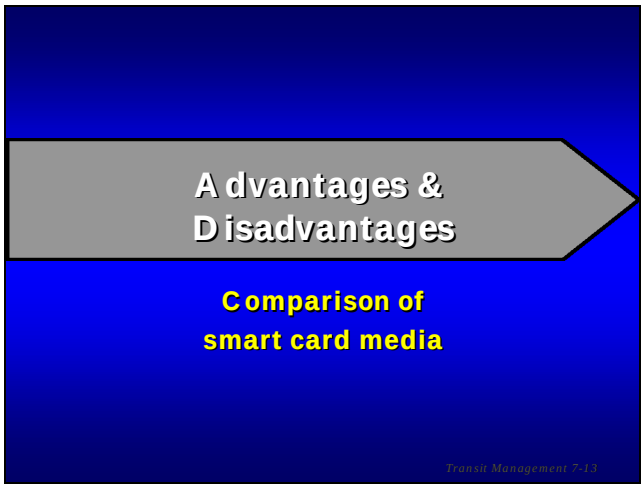
Automated Fare Payment Media, Continued

Slide: Advantages & Dis-advantages



Advantages & dis-advantages

The following table compares magnetic stripe, contact chip and contact chip cards.

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Automated Fare Payment Media, Continued

Table 7-1: Comparison of Card Technologies

	Magnetic stripe	Contact chip card	Contactless card
Reliability and Durability	Mag. stripe can be buried in plastic for added protection • some cards are easily damaged and may need to be replaced frequently • in past, mag. stripe could be damaged by a powerful refrigerator magnet • some cards resist damage • virtually immune to inadvertent mag. damage	More reliable than mag. stripe • recent advances in the development of "flash memory," a type of EEPROM, has increased the performance and lowered the cost of integrated circuit cards	Currently in testing phase in the U.S. • the risks are greater because of the unknown
Life of card	Long	Last longer than mag. stripe	Last longer than mag. stripe
Ease of use	Well-established technology, familiar to users	User can increase $ content Can be difficult to insert into readers	More convenient for mobility limited riders
Cost of card	Low initial cost low cost per use	Cost more than mag. stripe	Per card cost is higher than other types of cards
Security	Difficult to overwrite and hinders counterfeiters read/write capabilities • can increase security; e.g., Boston MBTA T-Pass can't be used at same station twice within 30 min. • allows for collection of data and evaluation of system	Increased security (which may slower transaction speed): • bank card applications need fairly high security, so there are a number of checks (called handshaking) that are done back and forth between reader and chip • this takes longer	High
Maintenance	Mechanical systems that transport cards inside the read/write units are prone to failure		Less maintenance than both mag. stripe and contact chip • no moving parts or slots on reader; no metal to contact, nowhere into which to stick gum, no wear
Operational efficiency	Insert-&-pass-through systems are slower than tokens • swipe type readers are faster, but write operations can be unreliable	Takes longer to pass through than a mag. swipe, especially insert-&-pass-through systems Not good technology for buses: • longer transaction time increases boarding times	Much faster throughput – passengers don't slow down to stick cards into slots • reader reacts to card, even inside a wallet • rapid boarding times

Multipurpose uses capability	No	Yes, high flexibility and universal use capabilities • programmable – better option for flexible fare structures	

Automated Fare Payment Media, Continued

Slide: Magnetic Stripe Example

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Automated Fare Payment Media, Continued

Magnetic stripe example

Say: New York City Transit uses Metro Card, a thin plastic read-write magnetic stripe card, for subway and bus fares. New York City Transit officials estimate that implementation of magnetic stripe cards, new turnstiles, and increased police presence have reduced revenue loss due to fare evasion by 50%.

The MetroCard:

- can be used at every (468) subway stop
- can be replenished with up to $80 of stored value
- expires after one year
  - ◊ reduces incentive for hackers and counterfeiters
- can be purchased in fixed denominations at subway stations and retail outlets
- MetroGold card allows for free transfers thereby eliminating many "2-fare" zones
  - ◊ an example of intermodal integration between subway and buses
- swipe-type readers installed on buses and subways make it fast

New York MTA estimates their Metro Card system will result in increased revenues of:

- 34 million from merchant fees and revenue float
- 140 million from unused value on cards
- 49 million from increased customer satisfaction

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Automated Fare Payment Media, Continued

Magnetic stripe example, *continued*

Lessons learned:

- The Metrocard project was a learning experience.
- At first, there were no discounts offered for purchase of the card, and no free transfers were available.
- Ridership did not increase until these benefits were added; once they were, buses had to be added to accommodate increased ridership.

Note to Instructor: A New York Times *article from the weekend of November 15-16, 1997 describes how surprised they were at the number of riders that used the Metro Card.*

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Automated Fare Payment Media, Continued

Example: Labor union

Explain that Sonny Hall, International President of the Transport Workers Union of America (TWU) related the following story at *The Spirit of Innovation in Transportation Conference* in Cambridge, MA, June 24-25, 1999:

- When installing the MetroGold system, the labor union was in on the ground floor.
  - ◊ Labor and Management were both involved in the planning stages, and were able to iron out installation and maintenance impediments early.
  - ◊ After the labor problems were solved, they were able to focus on the serious issues – namely responding to the customer's needs in competitive pricing.
- Sonny Hall contrasted this early involvement with an experience earlier:
  - ◊ When MY MTA was installing a new fare box system, the maintenance mechanics and their union were among the last people involved in the program.
  - ◊ This caused the program to ultimately fail because of institutional issues that were not addressed early enough, including lack of "buy-in" from the users of the new system, and maintenance tasks that were not in the labor agreement.

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Automated Fare Payment Media, Continued

Slide: Contact Chip Card Example

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Contact chip card example

Show sample again.

- **Remind** students that this was one of the samples you showed earlier.

The Citibank Manhattan Visa Cash card demo program failed for a number of reasons, including:

- lack of sufficient participating vendors
- inconvenient locations
- lack of public interest

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Automated Fare Payment Media, Continued

Slide: Contactless Card Examples

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Example: SmartTrip

Explain the following example:

In 1992, Congress granted $1,000,000 to the Washington Metropolitan Area Transit Authority to develop and demonstrate an Automated Fare Payment System. WMATA is testing a battery-powered, proximity smart card. This card combines the non-contact capabilities of proximity cards with the operational capabilities of contact-type integrated circuit smart cards. The SmartTrip system:

- works in conjunction with or in addition to the current system without reducing capabilities of the existing system
- permits complex fare structures based on distance, time of day, customer type, and frequency of use
- provides one card to use for fare payment at 29 MetroRail stations, 21 MetroBuses, and parking fees at 5 lots

Note to instructor: WMATA is pronounced **wah-mah-ta**.

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Automated Fare Payment Media, Continued

Example: Torrance, CA

Explain the example: The city of Torrance (Los Angeles area) tested proximity cards for bus fare payment over the course of a year and found:

- 58% of transit passengers purchased the cards
- purchasers found them:
  - ◊ easy to buy (70%)
  - ◊ easy to use (90%)
  - ◊ easy to renew (62%)
- vehicle down time due to proximity card fare payment malfunctions was 60-75% lower than the regular fareboxes
  - ◊ This advantage can be a tremendous opportunity for agencies choosing this type of system.
- drivers, dispatchers, and supervisors unanimously preferred the proximity card system

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Automated Fare Payment Media, Continued

Example: Ajax, Ontario

Ajax Transit's Combocards are re-loadable computerized cards into which the user deposits money. Combocards are either "Pass or purse" – valid as monthly passes or valid for a specific amount or "purse" of money.

Passenger places Combocard on validator when boarding vehicles, which:

- shows dollar value or time/days left on combocard
- displays balance on combocard after each use
- reminds user when to deposit more money or when to "renew" pass

Ajax Transit and the Combocard are integrated with the GO Transit train station. Passengers travelling to or from the GO Transit station receive reduced rates on Ajax buses.

Service to customers is enhanced through:

- elimination of cash
- automatic transfers
- the same card being kept and reused
- the addition of monetary value to card which can take place on any vehicle
- thirty-one day validity feature (triggered with the first day of use) which allows for selective payment and use
- extra convenience for handicapped clients
- multiple fares which can be paid on the card
- reduction in boarding time

Source:
http://www.townofajax.com/transportation/tran_ajax_combocard.html

Integrated Payment Systems

Length 30 minutes lecture/discussion

Slide: Integrated Payment Systems

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Outline

Explain slide.

Say: The media is the easy part of electronic fare payment. The integrated payment system is the hard part.

The financial community is interested in claiming a stake in the development of transit fare payment systems. They have considerable experience in managing card systems and see transit as a potential niche market.

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Integrated Payment Systems, Continued

Slide: What Is an Integrated Payment System?

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What are integrated payment systems?

Say: Integrated payment systems allow:

- multi-modal use: one card for different modes of transportation
  - ◊ e.g., distance-based fare systems involving rapid transit and bus operated by one transit provider
  - ◊ e.g., parking and electronic toll collection combinations with transit fare payment systems
- multi-carrier use: one card on all carriers
  - ◊ e.g., pay a single fare for a trip involving more than one transit provider
- integration of transit financial systems with nation's consumer financial system
  - ◊ e.g., interfaces between transit systems, transit rider accounts, banks, ATM cards, credit cards, stored value bank cards, etc.

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Integrated Payment Systems, Continued

Slide: State-of-the-Art Integrated Payment

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Integrated Payment Systems, Continued

Integration

Say: Integration of electronic fare payment systems can be discussed on three levels:

- Integration with transportation agencies (closed – transportation only – transportation issued and used only)
  - ◊ different modes with a single card
  - ◊ several transit agencies sharing one card

- Integration with commercial or open systems (open – multi – company can issue a card which is used in different systems)
  - ◊ local retailers, universities, merchants, and other non-transit related vendors use the same card as the transit fare card
  - ◊ card system is usually developed outside of the transit agency
  - ◊ transit agency is another customer for the bank

- Integration with government health and human services agencies (possibly closed – multi)
  - ◊ benefits transfer systems
  - ◊ For example, Ohio Cleveland RTA and the DPS (Department of Public Services) are working together to create a “welfare to work” system.

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Integrated Payment Systems, Continued

Example: Cleveland project

The Greater Cleveland Regional Transit Authority (GCRTA) hired an evaluation firm to assist them in assessing the possibilities of integrating some form of electronic fare payment media into their system. GCRTA has been exploring possible multi-use arrangements with multiple partners, including the Ohio Department of Human Services.

State-of-the-art integrated payment

Say: Here are examples of other integrated payment systems:

- fare systems based on passenger accounts
  - ◊ passengers billed based on information recorded each time they enter or exit a transit vehicle
  - ◊ have not been implemented
- multi-use electronic coin purses
  - ◊ would use an integrated circuit smart card to store value for use on multiple fares and small purchases

Advantages and dis-advantages discussion

Ask the following questions and write the answers on the board:

- How do you think integrated payment systems could benefit the passenger?
- How can they benefit the agency?
- Are there any risks you can think of?

Review the answers.

- **Say**: Let's compare your answers with our slides.

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Integrated Payment Systems, Continued

Slide: Integrated Payment Advantages

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Advantages of integrated payment systems

Review any item on the slide that was not covered already.

Fewer rider financial transactions

Say:
Integrated payment systems are being tested and explored throughout the United States in order to:

- reduce the number of financial transactions for the rider
- provide seamless transportation
- increase ridership and revenue

Links between transit providers

Say:
Integrated payment systems provide:

- more efficient links between transit providers

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Integrated Payment Systems, Continued

Flexible fare structure

Say: The smart card would provide the media to implement a distance based or time based fare structure. The benefits of these types of sophisticated fare structures will include:

- maximized revenue
- increased customer satisfaction
- creation of discount and incentive programs
- Integrated fare payment systems can have fare structures based on
  - ◊ time of day traveled
  - ◊ distance traveled
  - ◊ customer status

When integrating fare systems, flexible fare structures are especially important in multi-modal areas. Policy issues come up for:

- transit agencies
  - ◊ rail, commuter rail, and bus
- board-of-directors

Continued on next page

Integrated Payment Systems, Continued

Lower cash handling costs

Say: Implementation of card fare payment systems has resulted in increased revenues resulting from:

- increased customer satisfaction due to improved convenience and marketing opportunities
  - ◊ New Jersey Transit reports increased revenues of 12%.
- interest earned on prepaid fares
  - ◊ MARTA will receive float interest on each card until its value is spent.
- cards purchased by collectors
- unused stored value
  - ◊ NY MetroCard Company estimates that 1% of unused revenue would equal $140 million per year.
- opportunities to sell advertising on cards
- transaction fees

Say: The smart card system would improve revenue accountability and allocation to service providers by:

- distribution of funds based on actual service provided
  - ◊ provides means for multicarrier fare integration
- elimination of fraud by service providers
  - ◊ data recorded is specific, reliable, and eliminates potential for fare evasion

Convenient

Say: Integrated payment systems provide greater convenience to passengers because they:

- use a single payment media for all modes of transit
- reduce fare handling problems for physically challenged
- eliminate separate transfers
- reduce the number of fare media purchases

Continued on next page

Integrated Payment Systems, Continued

Generate customer satisfaction data

Say: The central transit control center can use data to track passenger routes and volume in order to improve:

- marketing
- scheduling
- route locations

Seamless system

Explain that integrated payment systems permit a seamless payment system.

Say: A smart card system decreases the potential for operator and passenger conflicts by reducing:

- transit operators' workload
- passengers' confusion about fare structures
- breakdown and malfunction of fare collection equipment

Examples

Say: Transit system operating and maintenance costs would be reduced by:

- reduced handling of fare payment media, such as coins and tokens
  - ◊ New Jersey Transit reported estimated cost savings of $2.7 million from reduced labor costs.
- reduced cost of maintaining fare collection equipment
  - ◊ Central Puget Sound estimates life-cycle cost reductions up to $8.5 million.
  - ◊ FARETRANS (Ventura County, CA) estimates $9.5 million per year in reduced fare evasion, $5 million in reduced data collection costs, and $990 thousand by eliminating transfer slips.
- The Visa cash stored value Smart Card (like the kind we passed around the room earlier) that was implemented in Atlanta has reduced MARTA's cash handling costs.

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Integrated Payment Systems, Continued

Slide: Integrated Payment Dis-advantages

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Dis-advantages

Review any item on the slide that was not covered already.

- Institutional barriers
  - ◊ Intermodal and multi-carrier projects need time to adjust to "turf wars."
  - ◊ The banks that back the integrated systems are now beginning to ask for the interest—commonly called the "float"—that is generated by card purchases. Since the card can be used on various modes of transportation, the distribution of the interest is negotiated among the transportation providers. This is an "area of negotiation" that transit agencies should consider.

Example

The Visa cash stored value Smart Card that was implemented in Atlanta has reduced MARTA's cash handling costs.

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Integrated Payment Systems, Continued

Slide: Integrated Payment Examples

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Ventura

Explain the following example:

Southern California Seamless Transit:

- Continuing a successful demonstration of both contact and proximity smart cards in Southern California in 1995, transit operators in Ventura County are implementing an electronic payment system that allows passengers to ride any of a number of local transit bus systems, using the same proximity fare card. In addition to making travel easier for the public, the systems provides automated collection of ridership data which can be sorted by route, time of day, type of fare and other parameters.

For more information, see the Ventura County Transportation Commission web site at *http://www.goventura.org:80/passport.htm*

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Integrated Payment Systems, Continued

Slide: Integrated Payment Examples

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Integrated payment example

Explain the following example:

King County Metro of Seattle has launched two intersystem fare demonstration pilots with the intent of reducing barriers to regional transit by integrating regional fare systems.

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Integrated Payment Systems, Continued

Sno-King and Community Transit

Explain: Sno-King and Community Transit:

- A single pass allows easier travel across the county line.
- two types of passes and fares:
  - ◊ Regional: $44 per month permits Community Transit and King County Metro commuters to ride Metro buses serving King County, excluding Seattle.
  - ◊ Regional Plus: $77 per month permits Community Transit and King County Metro commuters to transfer to/from Metro or Community Transit buses serving any location within the two transit systems, including Seattle.
- Passes and tickets are sold at specified locations or may be ordered over the telephone.
- Less expensive ticketbooks are available for infrequent travelers wishing to take advantage of the inter-system routes.

Sno-King and Pierce County Transit

Explain: Sno-King and Pierce County Transit:

- A single pass permits travel on King County Metro and on Pierce Transit locals.
- An additional charge is required for Express service.
  - ◊ Passes and tickets are sold at specified locations or may be ordered over the telephone.

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Integrated Payment Systems, Continued

Slide: Integrated Payment Examples

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Integrated payment example

Explain the following example of cashless purchase of fare tickets:

For fare purchases of $20-$60 (in 5-cent increments) BART accepts:

- VISA
- MasterCard
- Discover
- ATM
  - ◊ Interlink
  - ◊ Maestro
  - ◊ Explore

Tickets may be purchased by phone using a VISA or MasterCard.

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Integrated Payment Systems, Continued

Slide: Summary

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To think about

Say: Here are some examples to think about as we wrap up this module:

- Transit passes
  - ◊ employers can subsidize an employee's monthly transit card
- Stored value fare card
  - ◊ could store origins and destinations of trips in order to split revenues between different transit operators
  - ◊ read-write magnetic stripe and contact-type proximity smart cards are usable as stored value fare cards
- Cashless purchase of fare media
  - ◊ fare card dispensing machines that accept ATM and credit/debit cards for payment
  - ◊ ATM cards save the transit providers the fees charged by credit card companies

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Integrated Payment Systems, Continued

Summary

Explain resources that will provide students with additional information. Refer to the appendix for listings of related courses.

Transit Management Training Course	Title	ITS Professional Capacity Building		NTI course
		Technical Seminars	Short Courses	
Module 7: Electronic Fare Payment	ITS for Transit *(contains an in-depth case study on regional fare integration)*			x

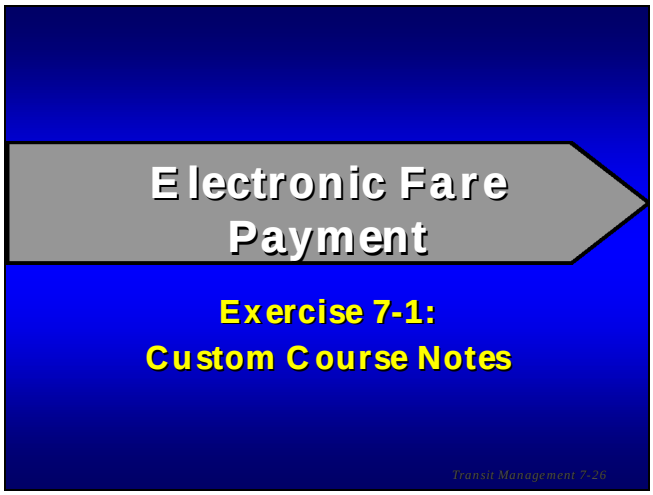
TABLE 7-1: APTS ELECTRONIC FARE PAYMENT TECHNOLOGY REFERENCE

Technology	*Description*	*Benefits, Costs, and Risks*
Automated fare Payment Media		
Magnetic Stripe	Magnetic stripe on a paper or plastic card	• Solid track record • Low cost per use • Long life of card when magnetic field is protected by plastic • Coercivity can be high to hinder counterfeiters • Could be used for small purchases and other non-transit purposes
Contact Chip Card	An integrated-circuit (IC) computer chip on a plastic card that can be read and written to via a contact (stick it in the slot) reader	• Longer transaction time • Chip capacity for multi-purpose use • Stored Value Bank cards are an application of the contact chip card
RF Proximity Card	A plastic card that can be electronically read and written to from a distance via radio waves	• Reduced maintenance costs • Faster throughput • Supports mobility-limited riders
Integrated Payment Systems		
Multicarrier or Multiuse or Integrated Payment System	Integrating the payment system of one transit operator with that of another entity, such as: • transit operators • human service benefits programs • electronic toll collection systems • bank card systems	• Institutional barriers must be resolved to execute the system • A seamless transportation payment system • Reduced capital costs

Exercise 7-1: Custom Course Notes

Length 30 min.

Slide: Exercise 7-1



Leader instructions

Read the "In this exercise" and the directions to the class.

Say:

- Turn your student guides to the TransLink case study on page _____. Read the case study, then answer the questions on page _____.

- **Allow** ten minutes for the students to read the case study and answer the questions.

Note to instructor: *This exercise continues after the questions.*

Continued on next page

Exercise 7-1: Custom Course Notes, Continued

In this exercise

You will:

- describe the benefits of using automated fare payment systems

Directions

Read the example provided and answer the questions that follow.

Case Study: TransLink system in San Francisco region

In the mid-nineties, Bay Area Rapid Transit (BART), Oakland Metropolitan Transit Commission, and the Central Contra Costa County Transit Authority (CCCTA) began development and implementation of the TransLink system.

- The system was designed to use magnetic stripe stored value tickets good at all of the 34 BART stations and 45 BART Express buses, as well as the 112 CCCTA buses.
- Each ticket was designed to have its own serial number that would have eventually allowed individual rides to be tracked.
- All the buses used in the system were equipped with bus ticket validators supplied by CGA of France.
- The original plans included expansion to light rail vehicles and buses of San Francisco Muni and buses operated by Golden Gate Transit.

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Exercise 7-1: Custom Course Notes, Continued

Case Study: TransLink system in San Francisco region, *continued*

TransLink was planned and designed to include future needs, in order to accommodate both organizational and technological changes among the cooperating organizations. The participants continued to evaluate their individual needs and to assess further possible choices of advanced fare media during an operational test phase.

- The initial demonstration of the magnetic stripe card media failed. The cards were not flexible enough to meet regional needs.

Currently, more than 20 regional transit agencies in the Bay area are developing and implementing the TransLink effort. The Metropolitan Transportation Commission, the lead agency in this effort, determined that the most appropriate form of card technology would be a regional integrated system using contactless smart cards.

- Partnerships with private companies have been encouraged.
- Private sector participation in system management, integration and operational processes, including clearinghouse functions, is expected.

Source: APTS State of the Art Update '96, p. 105 and APTS State of the Art Update '98, p. 4-9

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Exercise 7-1: Custom Course Notes, Continued

Question 1 What difficulties surfaced in the TransLink project?

Question 2 What possible benefits might TransLink expect?

Question 3 List three benefits this technology could provide to your transit system or region.

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Exercise 7-1: Custom Course Notes, Continued

Turn to Module 10

When students are finished with Exercise 7-1, direct them to Module 10.

Say: Open your book to Module 10, page _____. Using the student guide's information about Electronic Fare Payment and your knowledge of your own region and agency, customize this quick reference to help you plan when you return to your office. Respond to each item as follows:

- In **item 1**, circle the fare payment technologies that are currently used in your region. Highlight potential areas of future interest.

- In **item 2**, read each of the questions and answer yes or no. "Yes" answers suggest your interest in Electronic Fare Payment.

- Read **item 3** to identify which types of technology are best suited to solve particular problems.

- In **item 4**, tell the students to write their own action items and/or ideas that this module suggests to them. For example:
  - ◊ Are there any questions you want answered?
  - ◊ Were there any web sites that you wanted to look at when you return to the office?
  - ◊ Were there any courses or resources you wanted to find out more about?
  - ◊ Did we mention any transit example that you want more information about — who can you contact and where?

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Exercise 7-1: Custom Course Notes, Continued

For more information For additional information, use the following table to look up additional examples of what is going on in the field.

Electronic Fare Payment Examples			
Technology	**Story**	***Update '98***	**Additional info**
Magnetic Stripe Stored Value Card	MetroCard by the MTA of New York City Transit	p. 4-10	*Update '96,* p. 100
Stored Value Card	VisaCash card by MARTA in Atlanta, GA	p. 4-11	*Update '96,* p. 102
Contactless Smart Card	The Passport program by seven transit agencies in Ventura County, CA	p. 4-10	*Update '96,* p. 106
	Demonstration trial with six transit agencies and the Washington State Ferry in Seattle/ Central Puget Sound area, WA	p. 4-8	